IOOS Coastal and Ocean Modeling Testbed for Puerto Rico and the Virgin Islands: Field Cases and Cyber-Infrastructure

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Operational forecasting of storm surge and inundation events in U.S. island regions, such as the Caribbean and Pacific, poses many challenges. In contrast to mild-sloped sandy beaches, wind waves have a significant contribution in driving storm surge in these steep, reef-fringed environments. Also, relatively few studies have focused on the wave and storm surge dynamics in these environments compared to mild-sloped coastlines. As a result, the National Weather Service lacked operational inundation guidance in these island regions. Since Puerto Rico and the U.S. Virgin Islands are frequented by hurricanes and are well-instrumented, it is an ideal region for model inter-comparison with the view to identifying candidates for operational use. This project, which forms part of U.S. IOOS®'s Coastal and Ocean Modeling Testbed (COMT), aims to evaluate and inter-compare a number of coupled wave and surge models for potential operational implementation at NOAA's National Hurricane Center (NHC) and tropical island Weather Forecast Offices. Key in this inter-comparison is the cyber-infrastructure that enables the analysis, comparison and sharing of model results (e.g. wind velocities, wave heights and surge levels) in a highly-portable and efficient way. This presentation will describe the included models, namely ADCIRC-SWAN, SLOSH-SWAN, WAVEWATCH III, FUNWAVE and XBeach, and discuss the field cases being considered, namely Hurricane Georges (1998), Hurricane Irene (2011), Superstorm Sandy (2012) and two nearshore field campaigns. The cyber-infrastructure developed within the COMT will be applied to demonstrate the inter-comparison and analysis of these model results. An important deliverable of this testbed has been the generation of MEOWs/MOMs (maximum envelopes of water/maximum of MEOWs) by NHC that will be used as the first-ever storm surge and inundation evacuation guidance in Puerto Rico.